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JAN 18 2007

I. Introduction

In response to the Office Action dated August 18, 2006, claims 1, 4 and 9 have been amended. Claims 1-14 remain in the application. Re-examination and re-consideration of the application, as amended, is requested.

II. Objection to the Abstract

In paragraph (1) of the Office Action, the application was objected to as not containing an Abstract of the disclosure as required by 37 C.F.R. §1.72(b).

Applicants' attorney respectfully submits that the application does include an Abstract (from the original PCT application), but nonetheless has amended the specification as indicated above to include an Abstract.

III. Prior Art RejectionsA. The Office Action Rejections

On pages 2-4 of the Office Action, claims 1-14 were rejected under 35 U.S.C. §102(b) as being anticipated by J. Yu et al., "Adaptive quantization for one-bit sigma-delta modulation," IEE Proceedings-G, Vol. 139, No. 1, February 1992, pages 39-44 (Yu).

Applicants' attorney respectfully traverses the rejections.

B. The Yu Reference

Yu describes adaptive quantization for one-bit sigma-delta modulation. A fixed step size usually is used for a quantizer in a sigma-delta modulator or noise shaper, but it cannot always match input signals adequately if they are nonstationary, as in the case of music. An attempt at introducing adaptive quantisers, based on a digital maximum-magnitude technique, into 1-bit sigma-delta modulators has been made, although the basic idea appeared about two decades ago. The initial results show it to be a promising technique. The dynamic range of the sigma-delta modulator can be effectively increased by using an adaptive quantiser, and the signal/noise ratio is nearly independent of input level for sine wave inputs. This advantage may increase future applications of sigma-delta modulators.

C. The Applicants' Invention is Patentable Over the Yu Reference

The Applicants' claimed invention is patentable over the Yu reference, because the claims contain limitations not taught by the Yu reference.

Applicants' claimed invention involves adaptive modulation that includes generating a binary output signal from an analog input signal using a single quantization bit in a one-bit modulator and generating a scaling signal for scaling a step-size of the modulator using multiple quantization bits in a multiple-bit adapter.

The Yu reference, on the other hand, does not describe a similar structure. Moreover, the Yu reference does not describe an adapter that uses the input signal $|p(n)|$ rather than the original input signal $x(n)$ itself.

In Applicants' invention, however, the scaling signal $d(n)$ is an approximation of the amplitude of the signal $p(n)$, which is generated by filtering an error signal $e(n)$, wherein the error signal $e(n)$ represents the difference between the analog input signal $x(n)$ and an encoding signal $v(n)$. The encoding signal $v(n)$, in turn, is generated by multiplying a binary output signal $y(n)$ by the scaling signal $d(n)$, wherein the binary output signal $y(n)$ is generated by a quantizer from the signal $p(n)$ and the scaling signal $d(n)$ is generated by the adapter using an estimation of the absolute value of the signal $p(n)$. The scaling signal $d(n)$ is then used to scale the step-size of the modulator.

Thus, the Yu reference does not anticipate or render obvious Applicants' claimed invention. Moreover, the various elements of Applicants' claimed invention together provide operational advantages over the Yu reference. In addition, Applicants' invention solves problems not recognized by the Yu reference.

Thus, Applicants' attorney submits that independent claims 1 and 9 are allowable over the Yu reference. Further, dependent claims 2-8 and 10-14 are submitted to be allowable over the Yu reference in the same manner, because they are dependent on independent claims 1 and 9, respectively, and thus contain all the limitations of the independent claims. In addition, dependent claims 2-8 and 10-14 recite additional novel elements not shown by the Yu reference.

IV. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited.

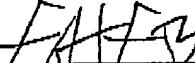
Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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